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Teaching The Community, The Efficient Use And Saving Of Water In The Municipality

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ABSTRACT.

In the development of this article, the methodological implications that in theory respect the principle of efficient use and saving of water are questioned. Based on legal considerations and theoretical principles such as Law 373 of 1996, the policies of the Ministry of Environment and Sustainable Development and the guidelines issued by the Guavio Regional Autonomous Corporation (CORPOGUAVIO); The purpose of this is to find out what actions should be used in the municipality to raise awareness among the population about the importance of water resources for life, the human responsibility to take care of them, and the magnitude of the current problem of inappropriate use and waste of water. Reforestation campaigns are carried out in the areas surrounding the Chinancocha stream, which is the main source of water supply in the municipality for the urban aqueduct; installation of macro meters and valves that allow continuous monitoring of water flow in the aqueduct infrastructure, mitigating the possibility of leaks; implementation of rates for the aqueduct and sewage service with the main purpose of raising user awareness.

Keywords: Water, Watch out, Reforestation

I. INTRODUCTION

The municipality of Junín- Cundinamarca, through the public services office, formulates the program of efficient use and saving of water for the urban aqueduct, framed within Law 373 of 1996, the policies of the Ministry of the Environment and Sustainable Development and the guidelines issued by the CORPOGUAVIO corporation.

In accordance with these guidelines, the municipality's mayor's office proposes that the academy, and for this purpose the Universidad Distrital Francisco José de Caldas, help guide the educational talks that will allow its inhabitants to access the necessary instruc-

tion to understand in an adequate and practical way the efficient use and saving of water resources.

This project is intended to involve one thousand (1000) inhabitants of the area, involving the great majority of sectors present in the daily activities of the municipality, including the student population, to which the greatest training efforts are directed.

It is believed that it is the population that can best contribute to the transmission of knowledge in the area.According to the formulation presented, the project seeks to raise community awareness about the culture of saving, efficient use and conservation of water resources. In addition to guiding the activities necessary for the protection of the micro basin of the Chinagocha stream, the main source of water supply for the municipality's urban aqueduct.

The proposal makes it possible to establish programs and mechanisms that improve the reduction of water losses in all phases of the aqueduct system. Situations that allow in the best way to maintain a sustainable development, understood as the one that leads to an economic growth and elevation of quality of life and social welfare without exhausting the base of renewable natural resources. The development of the activities carried out on the population are related to the introduction of the "program for efficient use and saving of water" known as the PUEAA.

This involves a set of actions to be developed and adopted by the entities in charge of water supply, sewerage, irrigation, drainage and hydroelectric production services and other users of water resources.

II. STUDY AREA

The municipality of Junín was founded on August 13, 1550, is located southeast of the department of Cundinamarca in the eastern mountain range, 103 km from Bogotá, is part of the province of Guavio in conjunction with the municipalities of Gacheta, Gachalá, Gama and Ubalá; its municipal seat is located at the coordinates 4°47'45" north latitude and 73°38'20" west longitude, at an altitude above sea level of 2. Its limits are: to the north with Gacheta and Guatavita, to the east with Gama and Gachalá, to the south with Fomeque, and to the west with La Calera and Guasca.It has an area of 34022 hectares; its main sources of production are: Agriculture, dual-purpose livestock, tourism and the generation of handicrafts; it does not have air and fluvial communication routes, and the terrestrial ones are:

Junìn-Guasca-Bogotá
Junìn-Gachetá
Junìn-Gama
Junìn-San Francisco-Sueva-Guasca
Junìn-Claraval-Chuscales.

The relief in the municipality of Junín is mountainous; the highest part corresponds to reliefs of glacial origin with landscapes of steep ridges and spines. The territory has me-

dium, cold and paramo thermal floors, with a share of 5.3%, 62.5% and 32.2%, respectively, of the total area of the territory.

There are rivers such as: Guavio, Chorreras, Santa Barbara, Rucio and Negro and in addition to these there are smaller streams such as lagoons, represented by: La Bolsa, Laguna Negra, Laguna Colorada, Lagunas de Gacheta, as well as streams such as: la chinagocha, La quebrada de los Muertos, chorrera among others that feed the basins of the Guavio and Santa Barbara rivers, Regarding its political-administrative division, the territory has 24 villages and three inspections.

Table 1. Political-administrative division. Source: Esquema de Ordenamiento Territorial Junín, 2001.

Junín Centro	Claraval	Chuscales	Sueva
Junín Centro *	Claraval Centro	Chuscales Centro	Sueva Centro
Alemania	Aposentos	Centro Alto	El Carmen
El Valle de Jesús	Arenal	Centro Bajo	La Vega
San Antonio	Centro Alto	Barroblanco	Nemostén
San Pedro	Guarumo	Carrizal	Potreritos
San Rafael	La Aldea	Colombia	
San Roque	Terama	Córdoba	San José
Santa Bárbara San Francisco		Chorrillos	
		El Carmen	
		Maracaibo	

According to the document of the Municipal Development Plan of the territory for the years 2008-2011, the population of the municipality is estimated at 8115 inhabitants.

Table 2. Total population of the municipality of Junín by age and sex for the year 2007. Source: Junín Municipal Development Plan 2008-2011

Age range	Total men	Total women	Total men and women
0 A 4	308	339	647
5 A 9	440	384	824
10 A 14	452	389	841
15 A19	392	369	761
20 A 24	283	235	518
25 A 29	218	217	435
30 A 34	180	216	396
35 A 39	228	226	454
40 A 44	194	251	445
45 A 49	215	240	455
50 A 54	224	232	456
55 A 59	193	171	364
60 A 64	157	154	311
65 A 69	158	189	347
70 A 74	131	211	342
75 A 79	135	141	276
80 O MAS	127	116	243
TOTAL	**4.035**	**4.080**	**8.115**

The rural population is shown in Figure 1.

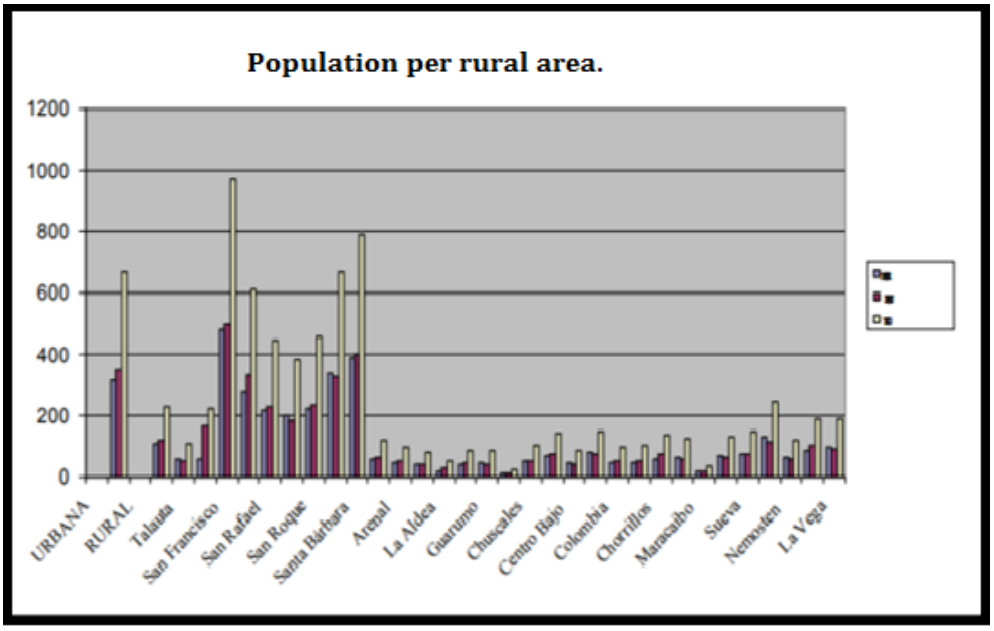

Figure 1. Population by villages. Source: Junín Municipal Development Plan 2008-2011.

From this information, it can be concluded that the highest concentration of population in the municipality is observed in the village of San Francisco with 974 inhabitants, which represents 12% of the total population of the territory, followed by the village of

Santa Barbara with 790 inhabitants representing 9.73%, and finally 667 inhabitants in the urban area and the village of El Valle representing 8.22% each.Regarding the population data of the municipality and according to the information provided by the DANE, we have:

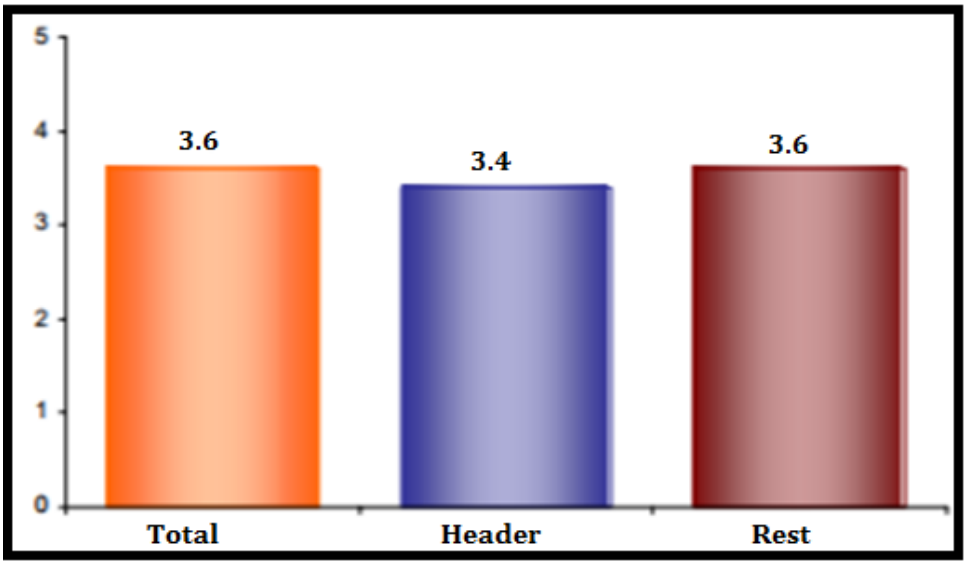

Figure 2. Number of persons per household. Source: DANE Bulletin, 2005.
From the above illustration it can be concluded that on average the number of people per household in the municipality is 3-4.

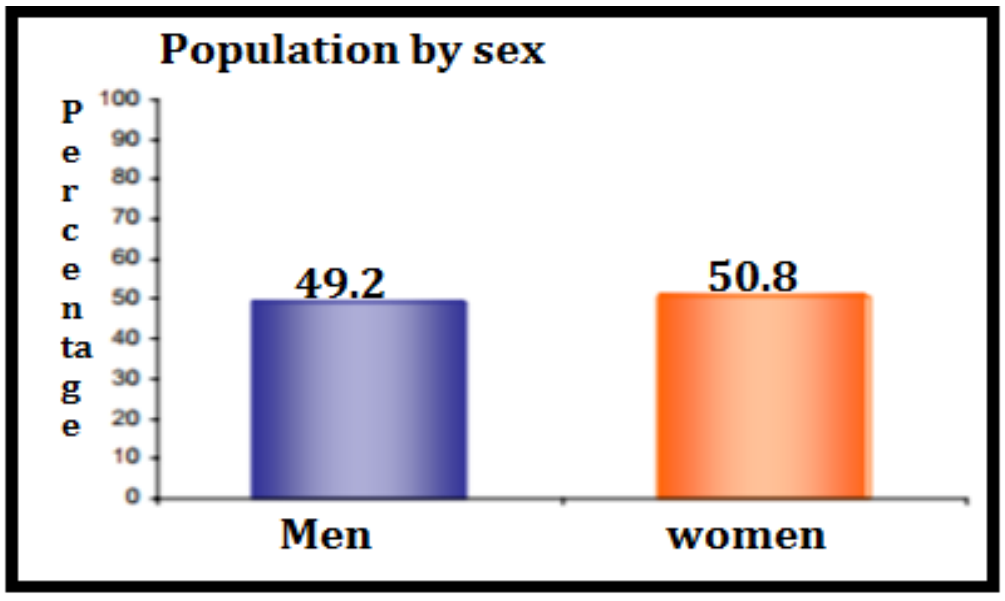

Figure 3. Population by sex. Source: DANE Bulletin, 2005.

In the municipality of Junín, 49.2% of the total population is male and 50.8% is female. It is important for the applicability of the process of activities to generate awareness of water care; to know the degree of education to which the population has access, in order to implement activities to ensure the understanding of society.

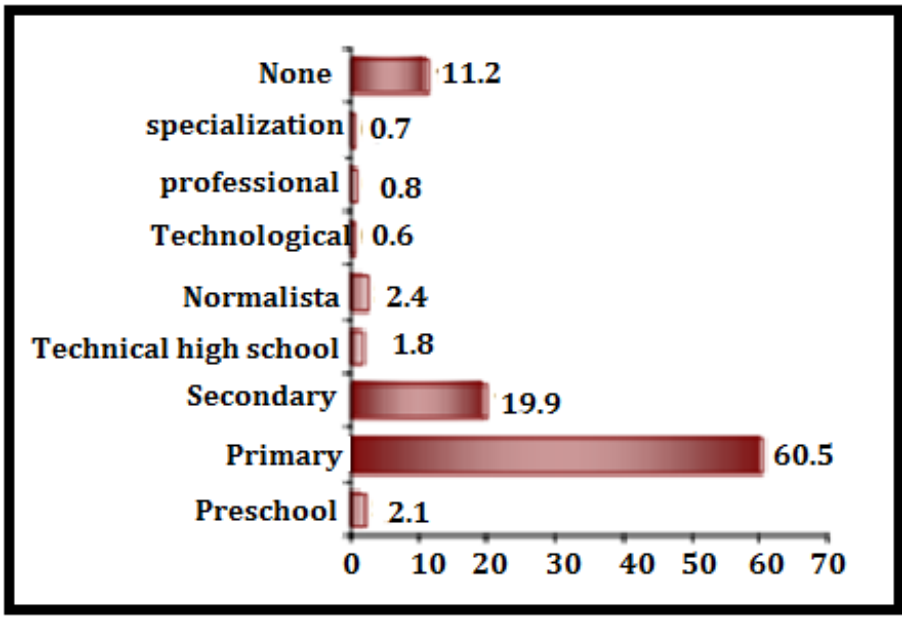

Figure 4. Educational level. Source: DANE Bulletin, 2005.

The above illustration shows that 60.5% of the population has primary education, 19.9% has secondary education, 0.8% has professional education and 0.7% of the population has completed specialized and related studies. By knowing the territory in which we will act, the activities carried out in this territory become more effective and efficient, thus achieving a common goal.

III. REGULATIONS

The municipality has a hydrographic network composed of a network of rivers and streams, which is part of the Guavio river basin, the basin includes 12 municipalities, including the municipality of Junín, in the jurisdiction of CORPOGUAVIO.

Law 373 of 1997, Establishes the program for the efficient use and saving of water. Decrees that environmental and municipal plans must incorporate a PUEAA that integrates projects and actions to be adopted by the entities responsible for the provision of water supply, sewerage, irrigation and drainage services and the users of water resources, and that must be based on the diagnosis of the water supply of the supply sources; the corresponding environmental authorities are responsible for approving the implementation and execution of such programs.

Regarding the preparation and presentation of the programs, Article 3 establishes that the service providers must submit the PUEAA to the environmental authorities and the latter will prepare a summary to be submitted to the Ministry of the Environment. Article 4 deals with the reduction of losses in each aqueduct system, where the Comisión de Regulación de Agua Potable y Saneamiento Básico will set the annual goals, and the environmental authorities for the users in the area of its jurisdiction.

It is also established that in any activity that generates liquid effluents, water must be reused in primary and secondary activities. Articles 7 and 8 deal with basic and maximum consumptions and tariff incentives, where the environmental authorities must define the mechanisms to encourage the efficient use and saving of water and discourage the inefficient use of the resource. Projects that include water consumption must include in the study of supply sources the supply of rainwater; hydrogeological studies will be carried out by the environmental authorities.

The law indicates that there must be educational campaigns for users and teaching programs that include topics related to the rational and efficient use of water, the implementation of low water consumption technology and the gradual replacement of high consumption equipment.In addition, the program indicates that special management zones, such as moorlands, cloud forests, areas of influence of aquifer springs and fluvial stars must be acquired by the environmental entities in order to initiate the recovery, protection and conservation processes. Finally, the environmental entities within each of their jurisdictions must apply the corresponding sanctions to service providers and users whowaste water.
Decree 1956 of 2015, makes a series of clarifications to Decree 1076 of 2015 through which the Sole Regulatory Decree of the Environment and Sustainable Development Sector is issued. Regarding the water resource, in Article 7 it establishes the minimum aspects of the management of the Resource in the chapter of use and exploitation of water; in Article 8 of the procedure of the Plan of Reconversion to Clean Technologies in Discharge Management it states that those who are holders of discharge permits may opt for the execution of the plan of Reconversion to Clean Technologies in Discharge Management and in such case, the plan must be submitted to the competent environmental authority within the first year of the term.

IV. PROBLEM FORMULATION

One of the most important resources for life on the Planet is water, it is the main source of development of life forms; water is essential for the survival of all living beings and based on this fact, humanity as a rational being must ensure the care and conservation of this resource, not only to guarantee the survival of its species but also to take care of all existing species and thus guarantee an environmental stability that allows life on Planet Earth. At present, the ways in which human beings throughout history have unbalanced the environment in which they live, and have used and misused resources without guaranteeing their sustainability, are very evident. It is evident the environmental problems

that we are living today where there are several causes of environmental imbalance and pollution, nature has shown through natural disasters how we have modified it and how its sustainability has been put at risk by the use of pollutants that only humans use for their industries and technological development.

One of the main and most important imbalances presented is water contamination, the waste of water and the bad use of its sources; it is important to highlight the global problem where inhabitants of a population are forced to consume contaminated water, this is one of the items that should be worked mainly. In the territory of the municipality of Junín there are also points of water contamination, for this reason it is necessary the prompt action of public entities and the population to mitigate these environmental risks. It is important to emphasize the participation of the population in order to achieve a mutual goal; the entities as such can act and generate water saving projects, but if the population does not become aware of the proper use of the resource, there will be no positive changes in water quality in the municipality.In this process, the Universidad Distrital Francisco José de Caldas, acts as an entity of population awareness, generating training in environmental education to achieve social awareness, but most importantly to ensure a sustainable and sustainable use of water resources in the municipality.

V. METHODOLOGY

To solve this problem, the municipality of Junín, through the Public Services Office, formulates the Program for Efficient Use and Saving of Water (PUEAA), which contains a set of projects and actions to be developed and adopted by the entities responsible for the provision of water supply, sewerage, irrigation and drainage services, hydroelectric production and other users of water resources, in this case aimed directly at the Urban Aqueduct. For the formulation of the PUEAA, programs and projects aimed at saving and efficient use of water resources are being developed. There are 7 programs proposed to be implemented. Each of them describes the type of measure it represents, the impacts to be controlled, the scope of the program and the activities to be carried out.

- Program 1:

"Reforestation of the areas surrounding the Chinagocha stream, supply source of the urban aqueduct of the municipality of Junín."
Type of measure: Prevention, mitigation and control.
Impacts to be controlled:
- Gradual decrease of the water resource at the source and downstream due to increased evaporation.
- Deterioration of the ecological flow.
- Deterioration of the existing treatment systems in the urban aqueduct's drinking water treatment plant.
Scope: 15 hectares will be reforested during the five years of PUEAA implementation in the areas surrounding the Chinagocha Creek; 16,500 species of native vegetation will be planted; 3 hectares will be reforested per year.

- Program 2:

"Installation and revision of macro meters and valves."
Type of measure: Mitigation and control.
Impacts to be controlled: Regulation of water flows in the aqueduct infrastructure.

- Program 3:

"Review and monitoring of the operation of micro-meters and detection of water leaks in the distribution system.".
Type of measure: Monitoring and control.
Impacts to be controlled: Water losses in the distribution network due to malfunctioning of metering equipment (micro-meters): due to fraudulent connections and water leaks that are difficult to detect.

- Program 4:

"Implementation of the tariff study for aqueduct and sewerage services."
Type of measure: Control.
Impacts to be controlled:
- Waste of water at the end user.
- Improve the financial efficiency of the Public Utilities Office.

- Program 5.

"Acquisition and installation of water-saving devices for the buildings of the official entities of the municipality."
Type of measure: Implementation.
Impacts to be controlled: High water consumption by official users.

- Program 6.

"Environmental education for the community of the municipality of Junín."
Type of measure: Environmental education and awareness.
Impacts to be controlled:
- High water consumption by subscribers in the urban area.
- Pollution in the municipality's water sources.

- Program 7.

"Training in environmental education, management of PTAP and labor competencies to urban aqueduct operators."
Type of measure: Environmental education and training.
Impacts to be controlled:
- Water losses in the entire structure of the urban aqueduct system.
- Deficiency in the quality of water supplied to the population.

VI. CONCLUSIONS AND RECOMMENDATIONS

It is a description of the results achieved in the tests, with details of the conditions under

which the tests were performed. The analysis of such results is also included, although this can also be documented in a new section.

In Colombia, there are many municipalities with a lot of water potential, which has to be conserved for future generations, so it is necessary to make a pedagogy of environmental conservation, the conservation of watersheds and the best use of this resource among the population of the territory adjacent to these water sources.

It is the duty of the government to work with the community for the better management of water resources in these times, where climate change significantly affects all areas of the country and the plant.

It is important to raise awareness in the student population, to begin to change the situational awareness from the youngest, so that they become primary agents that favor the change of perception regarding the conservation of water sources.

REFERENCES

1. Boletín 2, (2005). de 4 Información correspondiente a la población censada en hogares particulares Censo General 2005 Perfil Junín - Cundinamarca. 20 de octubre de 2017, de DANE
2. Castillo Jé Numael Jiménez Alcalde Municipal. (2008-2011). "Por Junín vamos en serio". En Plan de desarrollo municipal de junín 2008 - 2011(88). Junín.
3. Sitio oficial de Junín en Cundinamarca, Colombia. (-). Municipio de Junin. 20 de octubre de 2017, de Alcaldía de Junín - Cundinamarca Sitio web: http://www.junin-cundinamarca.gov.co/indicadores.shtml
4. Programa de uso eficiente y ahorro del agua del municipio de Junín.
5. Zonificación ecológica del municipio de Junín, Cundinamarca. En Junín (252). Colombia.
6. Decreto número 1956 de 2015, Ministerio de ambiente y desarrollo sostenible.
7. LEY 373 DE 1997, Dada en Santafé de Bogotá, D.C., a 6 de junio de 1997.
8. https://www.dane.gov.co/files/censo2005/perfiles/cundinamarca/junin.pdf.